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Dated

29 January 2004



1/77  
30DEC02 002893/002891  
P01/7700 0.00-0230237.0

# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

THE PATENT OFFICE

28 DEC 2002

NEWPORT

The Patent Office

Cardiff Road  
Newport  
South Wales  
NP10 8QQ

1. Your reference

SPIGOT

2. Patent application number

(The Patent Office will fill in this part)

0230237.0

28 DEC 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

ELOPAK SYSTEMS AG  
CHERSTRASSE 4  
POSTFACH  
CH-8152 GLATTBRUGG  
SWITZERLAND

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

CANTON OF ZURICH, SWITZERLAND

05701294002

4. Title of the invention

APPARATUS AND METHOD

5. Name of your agent (if you have one)

ANTHONY BURROWS

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

BUSINESS CENTRE WEST  
AVENUE ONE, BUSINESS PARK  
LETCHWORTH GARDEN CITY  
HERTFORDSHIRE  
SG6 2HB

Patents ADP number (if you know it)

31666001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

See note (d)

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document.

Continuation sheets of this form

Description

8

Claim(s)

Abstract

Drawing(s)

1 + 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

*Anthony Burrows*

Signature

*24 December 2002*

Date

ANTHONY BURROWS - AGENT

12. Name and daytime telephone number of person to contact in the United Kingdom

ANTHONY BURROWS  
01462-481755

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Notes

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APPARATUS AND METHOD

This invention relates to apparatus for use in welding a screw-threaded pour spout fitment to a container, to a method of welding such fitment to such container, and to a spigot which can be included in the apparatus.

Applicators are known for ultrasonically welding plastics, screw-threaded pour spout fitments to plastics-coated paperboard cartons from the insides of open tops of the cartons. The applicator may include a member rotating about a horizontal axis and comprised of a plurality of arms extending from a hub, each arm carrying near its outer end a horizontally protruding head for receiving the fitment. The fitment usually consists of a screw cap screwed onto a flanged, externally-threaded, pour spout. As the member rotates, a fitment on the head is transported by the arm to a position co-axial with an ultrasonic welding horn formed co-axially at its free end with a recess. Then the member is advanced along its axis of rotation to introduce the fitment into a hole through the wall of a carton until the flange arrives at the inside surface of the wall. With the fitment in that position, the horn is advanced to receive, with clearance, the cap, the threaded part of the pour spout, and the head and vibrantly (Ultra sonic) presses together, between its free end and an annular surface portion of the arm, the flange and the carton wall so as to weld the flange to the inside of the wall. We have found that applicators of this type suffer from the problem that, depending upon

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manufacturing tolerances in the fitment, application of high energy by the horn, in order to obtain a good weld between the flange and the wall, can result in such vibration of the fitment as to cause the screw threads of the cap and the

5. spout to weld together to a degree that the cap is very hard, or even impossible, for a human being to unscrew from the spout without using a tool.

US-A-5653832 discloses an applicator of this type which includes a downwardly-forwardly slanted arm portion carrying

10 a spud and a weld back-up support which surrounds the inner end of the spud and serves to engage the axially outer face of a flange of the fitment. The spud and the support are integral with each other and detachable as a unit from the arm portion for special cleaning. The annular support is

15 illustrated as being of external diameter equal to that of the flange of the fitment. The applicator also includes an ultrasonic horn formed with a recess in its free end, which recess receives with clearance the spud and a screw-threaded part of the fitment. The spud is shown as terminating short

20 of the substantially planar inside surface of the screw cap of the fitment.

A somewhat similar applicator is disclosed in US-A-5484374, except that the spud is provided by a spigot which is fixed in a shallow bore in the arm portion, that an

25 annular surface portion of the arm portion itself provides the weld back-up support, and that, with the fitment fully loaded onto the spud, the spud extends to the planar inside

surface of the screw cap of the fitment.

We consider that the applicators of both US-A-5653832 and US-A-5484374 may both, upon occasions, produce the problem mentioned above.

5       According to one aspect of the present invention, there is provided apparatus for use in welding a pour spout fitment to a container, comprising an ultrasonic welding horn formed with a recess at one end thereof for receiving part of said fitment, an anvil between an annular surface portion of which  
10       and said one end of the horn are vibrantly pressed a wall of said container and a flange of said fitment to weld said wall and said flange to each other, a head fixed relative to and protruding from said anvil for receiving said fitment over a free end thereof, and a ring substantially co-axial  
15       with said head and protruding substantially radially outwards from said head at an end thereof opposite to said free end for maintaining an annular, radially inner portion of said flange spaced axially outwards from said annular surface portion, the outer periphery of said ring being radially  
20       dimensioned to be received in said recess.

      According to another aspect of the present invention, there is provided a method of welding a pour spout fitment to a container, comprising causing the fitment to be received over a free end of a head fixed relative to and protruding  
25       from an anvil, introducing said head and thereby part of said fitment into a recess in an end of an ultrasonic welding horn, and vibrantly pressing together, between said end of

said horn and an annular surface portion of said anvil; a wall of said container and an annular, radially outer portion of a flange of said fitment to weld said wall and said radially outer portion together, while maintaining an annular, radially inner portion of said flange axially outwardly spaced from said annular surface portion.

Owing to the invention, it is possible to avoid excessive welding together of co-operating pieces of the fitment, which welding has the result of significantly increasing the torque required to open the fitment, which can in the worst circumstances make it impossible for a human being to open the fitment without using a tool.

The invention is particularly applicable in the case where the co-operating pieces of the fitment are screw threads.

The ring (and, if desired, the head) may be integral with the anvil, but are preferably in the form of a spigot detachable from the anvil to facilitate manufacture of the head and the ring, to facilitate cleaning, and to enable replacement of the head and the ring by another head and ring, particularly for adapting the apparatus more readily for differently dimensioned fitments.

According to a third aspect of the present invention, there is provided a spigot for mounting a pour spout fitment for welding to a container, said spigot comprising a head portion for receiving said fitment over one end thereof and a ring portion substantially co-axial with said head portion

and projecting substantially radially outwards from an end of said head portion opposite to said one end.

In order that the invention may be clearly and completely disclosed, reference will now be made, by way of example, to the accompanying drawing which illustrates in side elevation partly in vertical section a stage in the welding of a screw-threaded pour spout fitment to a carton.

Referring to the drawing, a rotary arm 2 of an applicator is formed with a horizontal, through bore 4 into which is inserted an externally threaded bolt 6 having a head 8. The bolt 6 is screwed into an internally threaded tubular portion 10 of a spigot 12 to clamp the spigot firmly to the arm 2. The spigot 12 also includes a circular-cylindrical head portion 14 and a ring portion 16 co-axial with the head portion 14 and the tubular portion 10 and projecting radially outwards from that end of the head portion 14 nearer the arm 2. The arm 2 is not only rotatable about a horizontal axis A but also reciprocable along that axis. In the condition shown in the drawing, the arm 2 has reached a position in which the spigot 12 is co-axial with an ultrasonic welding horn 18 which is horizontally reciprocable. The free end of the horn 18 is formed co-axially with a circular-cylindrical recess 20 which is of an internal diameter slightly greater than the external diameter of the ring portion 16. At a position above the level of the axis A, the head portion 14 is inserted into a plastics, screw-threaded, pour spout fitment 22 consisting of an internally threaded cap 24 and a flanged, externally-

threaded, pour spout 26, with a tamper-evident feature (not shown) in the region where the rim of the mouth of the cap 24 is adjacent to the flange 28 of the pour spout 26. An annular, radially inner portion of the flange 28 bears against, and is co-extensive with, the ring portion 16, whilst the remaining, annular, radially outer portion of the flange 28 protrudes radially beyond the ring portion 16 at a spacing from the arm 2. With the head portion 14 fully inserted into the fitment 22, there is also a spacing 30 between the free end of the spigot 12 and the substantially planar internal surface of the cap 24. Once the fitment 22 has been fully loaded onto the head portion 14, the arm 2 is displaced to the left along the axis A and is then rotated to a substantially vertical position in which the spigot 12 is substantially in a vertical plane containing the axis A. This brings the lower end of the arm 2 and, with it, the spigot 12 and the fitment 22 into the interior of a carton 32 comprised of paperboard coated on both faces with thermoplastics, possibly with the interposition of a gas barrier layer. Then the arm 2 is displaced to the right along the axis A to bring the arm 2, the spigot 12 and the fitment 22 into the condition shown in the drawing, in which the head portion 14 and the screw-threaded part of the fitment 22 have been introduced through a hole 34 through the wall of the carton 32 until the flange 28 comes to bear against the inside surface of the wall, as seen in the drawing. Then the ultrasonic horn 18 is moved to the left until it vibrantly

presses the carton wall and the annular, radially outer portion of the flange 28 against an annular surface portion of the arm 2, the head portion 14, the flange portion 16 and the screw-threaded part of the fitment 22 being received with clearance in the recess 20. The drawing shows the horn 18 in an intermediate position of this movement, in which it has just come to bear against the outside surface of the carton wall. The vibrational pressing together, between the arm 2 and the horn 18, of the carton wall and the annular, radially outer portion of the flange 28 welds the flange 28 securely to the thermoplastics coating at the inside surface of the wall of the carton 32. Then the arm 2 moves away to the left along the axis A and the horn 18 moves away to the right along the axis A and thereafter the arm 2 is turned out of the open top of the carton 32, whereafter the carton is advanced from the fitment-application station (partially represented in the drawing) to filling and sealing on the form-fill-seal packaging machine.

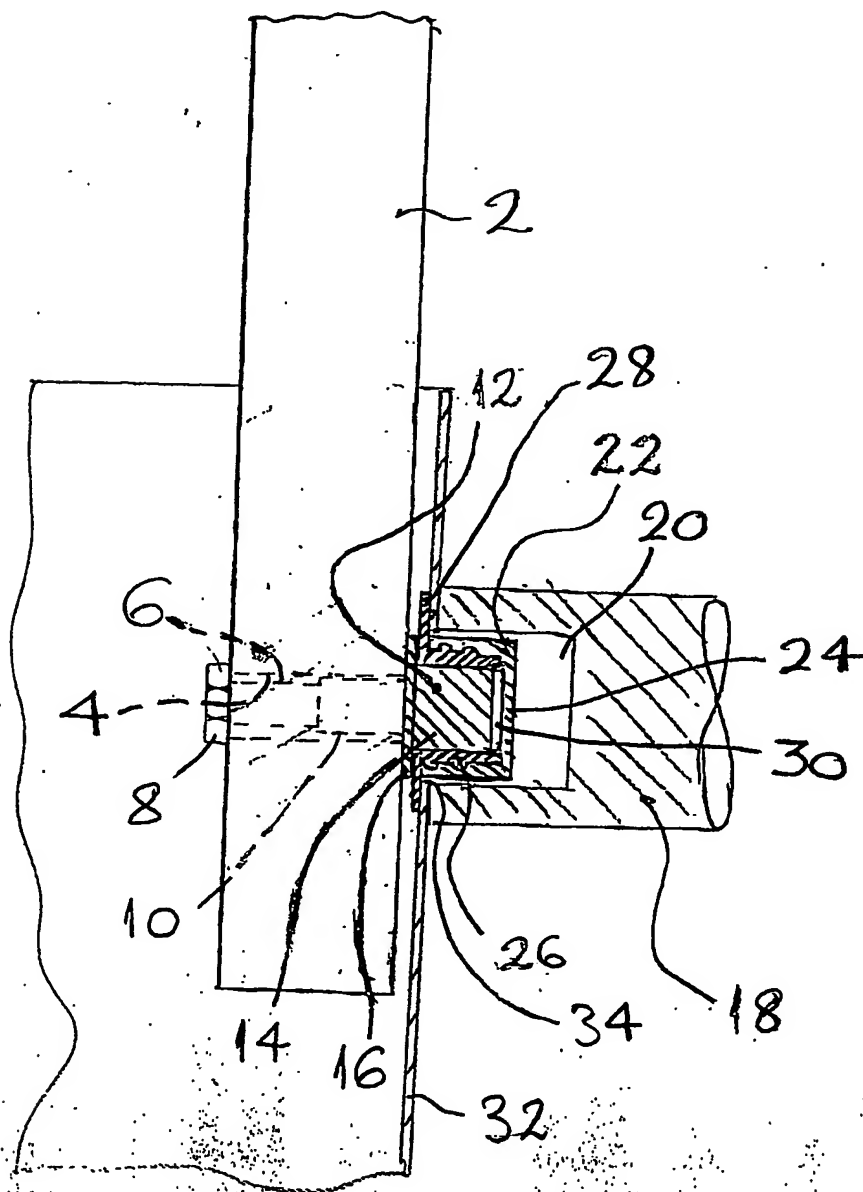
We have found that the provision of the ring portion 16 supporting only a radially inner annular portion of the flange 28 greatly reduces the risk of firm welding of the internal threading of the cap 24 to the external threading of the pour spout 26 induced by the vibrations emanating from the horn 18. It appears that the unwanted firm welding has been caused by the threads impacting against each other during the ultrasonic welding. We have furthermore found that provision of the spacing 30 further reduces that risk.

Nevertheless, it is still possible, if so desired, to control opening torque by adjusting the energy input, whilst still obtaining good welding of the flange 28 to the wall of the carton 32. The possible range of torque can be controlled to  
5 be from very easy to open to medium hard to open.

It will be understood that the axis of rotation A need not be horizontal but can be in any other orientation desired.

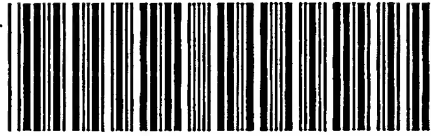
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PCT Application

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